REMARKS

Claims 1-23 are pending. Claims 3-5 and 18-19 stand allowed. Claims 1-2, 6, 8-17 and 20-21 stand rejected. Claim 7 stands objected to as being dependent on a rejected base claim. By this Amendment, claim 13 is amended and dependent claims 22 and 23 are added. Claim 13 has been amended to correct a grammatical error. Since claim 13, depends on claim 10, and not claim 11, "third digital signal" has been changed to "digital signal" to correct this grammatical error. In addition, "the digital frequency generator" in claim 13 has been changed to "the digital frequency source." It is respectfully submitted that "the digital frequency generator" as recited in claim 13 would be clearly interpreted by a person of ordinary skill in the art to be referring to the "digital frequency source" specified in claim 9 at least because claim 9 specifies this element to be "a digital frequency source to generate ..."

1. The Office Action rejects claim 16 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,509,052 to Cash. This rejection is respectfully traversed.

Anticipation under 35 U.S.C. §102(b) is a strict standard. "A claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

In the present application, Cash does not disclose all of the limitations specified in claim 16. For example, Cash does not disclose a method that includes capturing a frequency difference present at two antennas and further includes:

> producing an information signal onto which the frequency difference has been modulated

and

> analyzing the information signal to determine the frequency difference

where the frequency difference is the difference between the frequency of signals present at the first and second antennas as specified in claim 16 and therefore contained in all claims dependent thereon.

The Office Action asserts that column 7, lines 3-24 of "Cash teaches the capturing of the frequency difference using phase detectors 24/26 and processor 34 to analyze the frequency difference according to equations." Respectfully, this assertion is unsupported by the evidence of record. All that Cash teaches is that phase detectors 24, 26 provide an elevation or azimuth angle in electrical degrees (see column 5, line 7-10) and that processor 34 can convert the electrical degrees into any desired unit. For example, degrees could be converted to another angular unit such as radians, but even this is not disclosed. Clearly, conversion to a measure of a frequency difference is not disclosed. Cash does not disclose "analyzing the information signal to determine the frequency difference" as specified in claim 16. Since "[t]he identical invention must be shown in as complete detail as is contained in the ... claim," Cash does not anticipate claim 16. See *Richardson v. Suzuki Motor Co., id.*

2. The Office Action rejects claims 1, 6 and 21 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,680,124 to Stone et al. in view of U.S. Patent No. 5,255,000 to Puzzo. This rejection is respectfully traversed.

A. Stone et al. in view of Puzzo does not disclose, teach or suggest all of the limitations specified in claims 1, 6 and 21.

Claims 1 and 6: For example, as to claims 1 and 6, one limitation that is not disclosed, taught or suggested by Stone et al. in view of Puzzo is a receiver comprising a processor and:

> an RF bridge coupled to the processor to receive a reference signal from the processor

where the RF bridge includes

> a third frequency converter coupled to outputs of the first and second frequency converters

as specified in claims 1 and 6, and therefore contained in all claims dependent thereon.

First, with respect to claims 1 and 6 and the third frequency converter, the Office Action erroneously asserts that "Stone teaches the third frequency converter (linear mixer 71, FIG. 7) coupled to outputs of the first and second frequency converters." The Office Action bases its obviousness analysis on the erroneous assertion that linear mixer 71 reads on the third frequency converter specified in claim 1. This assertion is respectfully traversed.

The Office Action ignores the express teachings of Stone et al. (e.g., column 9, lines 60-61) that linear mixer 71 is an adder or summer of signals as the Office Action (e.g., at page 10, lines 1-4) continues to assert that linear mixer 71 is a frequency converter. The Office Action has no evidentiary support for the erroneous assertion that linear mixer 71 could be a frequency converter.

Linear mixer 71 can not be a frequency converter which requires a multiplier of signals. Stone et al. specifically teaches that the operation of linear mixer 71 is that of an adder or summer of signals (see column 9, lines 60-61). Referring to FIG. 5, Stone et al. discloses that "[t]he output signals of the two mixers 31 and 33 are summed in a linear mixer 41. These two signals are then fed through the first IF strips (not shown) of the receiver 43. The two RF signals are present within the band pass of the IF strips, separated by an amount equal to the scan frequency" (see column 7, lines 39-43 and FIG. 5 which is a simplified version of FIG. 7). A signal adder won't perform this frequency conversion function.

A multiplier of signals is required for frequency conversion. For example, attached hereto are a few pages from a 1968 edition of Communication Systems by B. P. Lathi (published by John Wiley & Sons, Inc.), a standard collage text on communications, that confirms this point. The Modulation Theorem on page 73 illustrates that multiplication in the time domain is required to shift frequencies of signals in the frequency domain (i.e., required for frequency conversion).

Furthermore, in a specific example of a balanced modulator illustrated on pages 161 and 162, Lathi shows that diode provide a nonlinear impedance necessary for frequency conversion, and that the power series expression for the current through a diode is $I=ae+be^2$. Lathi shows

that the quadradic term (e^2) in the expression of the current through a diode is responsible for producing the multiplied product of an arbitrary signal to be modulated (in the example, f(t)) and the carrier signal $\cos(\omega_c t)$. Signals at other frequencies are usually removed by filters.

Furthermore, it is well known that frequency conversion of a first signal (i.e., $\cos(\omega_1 t)$) is achieved by multiplying a local oscillator or reference signal (e.g., $\cos(\omega_2 t)$) by the first signal. , $\cos(\omega_1 t)$. The multiplication product, which is expressed as $\cos(\omega_1 t)\cos(\omega_2 t)$, is mathematically identical to the sum of two signals, one having the sum frequency, and the other having difference frequency:

$$\tfrac{1}{2}\cos(\omega_1 t+\omega_2 t) + \tfrac{1}{2}\cos(\omega_1 t-\omega_2 t).$$

In this way, multiplication of signals provides a heterodyned signal having two components. The first component has a frequency equal to the sum of the frequencies of the multiplied signals (i.e., $\tfrac{1}{2}\cos(\omega_1 t+\omega_2 t)$). The second component has a frequency equal to the difference of the frequencies of the multiplied signals (i.e., $\tfrac{1}{2}\cos(\omega_1 t-\omega_2 t)$). The frequency of the first signal, $\cos(\omega_1 t)$, is thusly converted in frequency to either the sum or the difference of the frequencies of the multiplied signals. Frequency conversion as specified in the claims requires a multiplier of signals.

In addition and again as to claims 1 and 6, another limitation that is not disclosed, taught or suggested by Stone et al. in view of Puzzo is a receiver comprising a processor and:

> an RF bridge coupled to the processor to receive a reference signal from the processor

as specified in claims 1 and 6, and therefore contained in all claims dependent thereon. Stone et al. does not disclose a processor (which the Office Action admits), and Puzzo does not disclose any signal originating from a processor. In summary, Stone et al. in view of Puzzo does not disclose, teach or suggest that the RF bridge receives "a reference signal from the processor" as specified in claims 1 and 6.

All that the Office Action asserts with respect to this feature is that Puzzo discloses processor 84 and that "it would have been obvious to one of ordinary skill in the art at the time of

the invention to modify Stone, and to include Puzzo's processor for measurement of angle of arrival and frequencies, such that the accurate angle of arrival of a transmitted signal could be computed."

First, even if this Office Action assertion were true, *arguendo*, the applied references still do not disclose, teach or suggest the structural limitation that the RF bridge receives "a reference signal from the processor." Puzzo does not disclose any signal originating from the processor. Accordingly, Stone et al. in view of Puzzo does not disclose, teach or suggest that the RF bridge receives "a reference signal from the processor" as specified in claims 1 and 6.

Second, the applied art does not teach or suggest any reason why anyone would be motivated to modify Puzzo to send a reference signal from its processor to any part of the device of Stone et al. The Office Action's assertion of a desire to compute "the accurate angle of arrival of a transmitted signal" does not constitute support for modifying Puzzo's processor to provide a reference signal and then connecting the reference signal to any part of the device of Stone et al. The Office Action fails to provide evidence of any motivation to modify Stone et al. or otherwise combine Stone et al. and Puzzo.

To establish a case of obviousness, the Patent and Trademark Office must demonstrate by substantial evidence that the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, contains some suggestion or incentive that would have motivated an ordinarily skilled person to modify the subject matter of a reference or combine the subject matters of the references to achieve the claimed subject matter. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). M.P.E.P. 2143.01 instructs that "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art." "[T]he central question is whether there is reason to combine references," *McGinley v. Franklin Sports, Inc.*, 262 1339, 1351-52, 60 1001, 1008 (Fed. Cir. 2001). "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re*

Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)." See M.P.E.P., section 2143.01, page 2100-98, Rev. 1, Feb. 2000, 7th Ed (emphasis in the original).

"[A] showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'," *Brown and Williamson Tobacco Corp. v. Phillip Morris Inc.*, 229 F.3d 1120, 1124-1125, 56 USPQ2d 1456, 1459 (Fed. Cir. 2000). "[T]here must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant," *In re Dance*, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed Cir. 1998). "[T]eachings of references can be combined only if there is some suggestion or incentive to do so," (emphasis in original), *In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988).

Motivation must be found with specificity. "[P]articular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention would have selected these components for combination in the manner claimed," *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). "[E]ven when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious," *In re Rouffet*, 149 F.3d 1350, 1359, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998). The Patent Office can satisfy this burden of showing the obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references," *In re Fitch*, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992).

Establishment of a suggestion or incentive to modify or combine prior art references requires substantial evidence of such suggestion or incentive. "The factual question of motivation is material to patentability, and could not be resolved on subjective belief of unknown authority," *In re Lee*, 61 USPQ2d 1430 (Fed. Cir. 2002). Assertions in an Office Action of such suggestion or motivation, without evidentiary support, is merely subjective belief and is insufficient to constitute substantial evidence upon which a legal conclusion can be based.

In re Lee describes a two-fold requirement for the Board of Patent Appeals and Interferences to establish a motivation to modify. First, the Board must make reasoned findings of fact, based on evidence on record. Second, the Board must also explain the reasoning by which the findings are deemed to support the Board's conclusion. It should be noted that these are requirements imposed on decisions of the Board, not decisions of the examiner corps. However, the examiner corps must still make the record (e.g., applied art teaches ...) upon which the factual findings of motivation can be based.

Tribunals of the Patent and Trademark Office are governed by the Administrative Procedures Act (in particular, 5 U.S.C. §706(2)), and their rulings are to receive the same judicial deference as do tribunals of other administrative agencies. See *Dickinson v. Zurko*, 527 U.S. 150, 50 USPQ2d 1930 (1999). Judicial review of a Board decision denying an application for patent is founded on the obligation of the agency to make necessary findings and to provide an administrative record showing the evidence on which the findings are based, accompanied by the agency's reasoning in reaching its conclusions. The judicial review is based on the administrative record. See *In re Zurko*, 258 F.2d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). The Board decision must be justified within the four corners of the record. See *In re Gartside*, 203 F.3d 1305, 1314, 53 USPQ2d 1769, 1774 (Fed. Cir. 2000).

The foundation of the principle of judicial deference to the rulings of agency tribunals is that the tribunal has specialized knowledge and expertise, such that when reasoned findings are made, a reviewing court may confidently defer to the agency's application of its knowledge in its areas of expertise. The "common knowledge and common sense," on which the Board in *In re Lee* relied in rejecting the Lee application, are not the specialized knowledge and expertise contemplated by the Administrative Procedures Act. Conclusory statements, such as it is "common knowledge," do not fulfill the agency's obligation. Reasoned findings are critical to the performance of agency function and judicial reliance on agency competence. The Board's findings must extend to all material facts and must be documented on the record, lest the "haze of so-called expertise" acquire insulation from accountability. *In re Lee*, 61 USPQ2d 1430 (Fed. Cir. 2002).

Claim 21: In another example and as to claim 21, one limitation that is not disclosed, taught or suggested by Stone et al. in view of Puzzo is a receiver comprising "a processor providing a reference signal" as specified in claim 21.

As discussed above with respect to the rejections of claims 1 and 6, the Office Action asserts that Puzzo discloses processor 84 and that "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Stone, and to include Puzzo's processor for measurement of angle of arrival and frequencies, such that the accurate angle of arrival of a transmitted signal could be computed."

First, and as discussed above with respect to the rejections of claims 1 and 6, Puzzo does not disclose any signal originating from the processor. Therefore, Stone et al. in view of Puzzo does not disclose, teach or suggest a receiver comprising "a processor providing a reference signal characterized by a reference frequency" as specified in claim 21.

Second, this Office Action's assertion of motivation lacks evidentiary support. The applied art does not teach or suggest any reason why anyone would be motivated to modify Puzzo to send a reference signal from its processor to any part of the device of Stone et al. The Office Action's assertion of a desire to compute "the accurate angle of arrival of a transmitted signal" does not constitute support for modifying Puzzo's processor to provide a reference signal and then connecting the reference signal to any part of the device of Stone et al. The Office Action fails to provide evidence of any motivation to modify Stone et al. or otherwise combine Stone et al. and Puzzo.

In addition and again with respect to claim 21, another limitation that is not disclosed, taught or suggested by Stone et al. in view of Puzzo is a receiver comprising an "RF bridge providing an information signal to the processor that is characterized by a frequency equal to the reference frequency modulated by a frequency difference" as specified in claim 21. Since neither Stone et al. nor Puzzo discloses any signal originating in the processor and being coupled to an RF bridge, Stone et al. in view of Puzzo does not have a reference signal upon which to modulate the frequency difference. Note that claim 21 specifies the reference frequency in the

claim element: "a processor providing a reference signal characterized by a reference frequency."

Even though the Office Action asserts that "it would have been obvious ... to modify Stone, and to include Puzzo's processor for measurement of angle of arrival and frequencies, such that the accurate angle of arrival of a transmitted signal could be computed," the assertion of a desire to compute "the accurate angle of arrival of a transmitted signal" does not constitute support for modifying Puzzo's processor to provide a reference signal as discussed above in greater detail. The Office Action fails to provide evidence of any motivation to modify Stone et al. or otherwise combine Stone et al. and Puzzo.

In addition and again with respect to claim 21, yet another limitation that is not disclosed, taught or suggested by Stone et al. in view of Puzzo is a receiver comprising:

> a processor providing a reference signal characterized by a reference frequency; and
>
> an RF bridge ... providing an information signal to the processor that is characterized by a frequency equal to the reference frequency modulated by a frequency difference, the frequency difference being a difference between a frequency of a signal received at one of the two antennas and a frequency of a signal received at another of the two antennas,

as specified in claim 21.

Stone et al. in view of Puzzo do not disclose, teach or suggest any way to compute the "frequency difference" as specified in the claim. Stone et al. discloses that the signals received at the antennas A_1 and A_2 and connected indirectly to heterodyne mixers 65 and 67, are of the same frequency and differ only in phase. Signals from frequency synthesizer 69 into heterodyne mixers 65 and 67 are separated by just 250 cycles. The outputs of mixers 65 and 67 are only added in linear mixer 71, thus preserving the frequency separation of 250 cycles. The bandwidths and center frequency of the combinations of IF strips and heterodyne mixers 73, 75, 77, 79 and 81 preserve the distinctness of the two signals separated by 250 cycles but the average frequency is reduces to 10 megacycles and 200 kilocycles by mixers 77 and 81, respectively.

Stone et al. then discloses that IF strip 81 is connected to IF strip 83, that IF strip 83 is connected to discriminator 99 and that discriminator is indirectly connected to 100KC VCO 105. However, at column 10, lines 22-25, Stone et al. makes clear that

> IF strip 83 filters the signal in such a way that only the signals from one of the antennas A_1 and A_2 is present at its output.

In Stone et al., IF strip 83 ensures that only one signal, not a difference signal, is provided to discriminator 99. The modulated by a frequency difference feature of the present claim 21 cannot be provided by Stone et al. because one of the frequencies needed to calculate a frequency difference is blocked by filter 83 according to column 10, lines 22-25 of Stone et al. The device of Stone et al. does not provide "an information signal to the processor that is characterized by a frequency equal to the reference frequency modulated by a frequency difference." Furthermore, Puzzo does not satisfy this limitation. Accordingly, Stone et al. in view of Puzzo does not disclose, teach or suggest all of the limitations specified in claim 21.

B. In addition to the discussion above with respect to the rejections of claims 1, 6 and 21, Stone et al. discloses a construction such that any attempt to modify linear mixer 71 to be a frequency converter would render the Stone et al. apparatus unsatisfactory for its intended purpose. "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)." See M.P.E.P., section 2143.01, page 2100-99, Rev. 1, Feb. 2000, 7th Ed (emphasis in the original). At least because modification of linear mixer 71 to be a frequency converter would render the Stone et al. apparatus inoperable, there is no suggestion or motivation to make the proposed modification in the applied references.

If linear mixer 71 were operated as a frequency converter (i.e., generating the sum and difference frequencies), as the Office Action contends, the Stone et al. apparatus would cease to work because no signal could pass from the antennas A1 and A2 through the 10 megacycle bandwidth of the 60 megacycle IF strip 73 to the rest of the receiver as discussed below.

More specifically, Stone et al. describes linear mixer 71 as a summer or adder of signals (see column 9, lines 60-61) and not a multiplier. While explaining the operation of this circuit, Stone et al. teaches that the frequency of the satellite signal received at antennas A1 and A2 is assumed to be 400 megacycles minus a Doppler component Δf (see column 9, lines 49-51). Stone et al. also teaches that the frequency from synthesizer 69 into mixer 65 "will be at 340 megacycles minus Δf" (see column 9, lines 52-55). The mixed signal out of mixer 65 is therefore 60 megacycles (i.e., the frequency difference between 400 MHz and 340 MHz). Similarly, Stone et al. also teaches that the frequency from synthesizer 69 into mixer 67 "will be at 340 megacycles plus 250 cycles minus Δf" (see column 9, lines 57-60). The mixed signal out of mixer 65 is therefore 60 megacycles plus 250 cycles (i.e., the frequency difference between 340 MHz and 400 MHz plus 250 cycles). Then, the signals out of mixers 65 and 67 are added linearly in linear mixer 71 (i.e., summed or superimposed on each other) and fed into a 60 megacycle IF strip 73 that has a bandwidth of 10 megacycles (see column 9, lines 60-64). The two signals out of mixers 65 and 67 are separated in frequency by 250 cycles. The 10 megacycle bandwidth of the 60 megacycle IF strip 73 passes both of the signals output from mixers 65 and 67 as separate signals. Thus, the circuit of Stone et al. requires that mixer 71 add, sum or superimpose the signals from mixers 65 and 67; otherwise, the circuit would not pass signals through IF strip 73.

On the other hand if, as the Office Action erroneously contends, linear mixer 71 were to be modified to be a frequency converter producing the sum and difference frequency signals, the sum and difference frequency signals could not pass through the 10 megacycle bandwidth of the 60 megacycle IF strip 73. The sum frequency signal would have a frequency of 120 megacycles plus 250 cycles, and the difference frequency signal would have a frequency of only 250 cycles. Both frequencies are outside of the bandwidth of the 10 megacycle bandwidth of the 60 megacycle IF strip 73. With the interpretation of linear mixer 71 as a frequency converter, as erroneously contended by the Office Action, neither signal could pass from the antennas A1 and A2 through the 10 megacycle bandwidth of the 60 megacycle IF strip 73 to the rest of the receiver. The interpretation of linear mixer 71 contended by the Office Action renders the circuit

unsuitable for its intended purpose. Motivation to modify cannot be found where the proposed modification would render the device unsuitable for its intended purpose. See *In re Gordon, id.*

3. The Office Action rejects claim 2 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,680,124 to Stone et al. in view of U.S. Patent No. 5,255,000 to Puzzo and further in view of U.S. Patent No. 6,147,640 to Wachs. This rejection is respectfully traversed.

A. As discussed above with respect to claim 1, upon which claim 2 depends, Stone et al. in view of Puzzo does not disclose, teach or suggest a receiver comprising:

> an RF bridge coupled to the processor to receive a reference signal from the processor

and where the RF bridge includes

> a third frequency converter coupled to outputs of the first and second frequency converters

as specified in claim 1, and therefore contained in all claims dependent thereon. Wachs does not provide a disclosure, and does not provide a motivation to combine a disclosure with Stone et al. in view of Puzzo, to achieve the receiver specified in claim 1 for at least the reasons discussed above with respect to claim 1.

B. Furthermore, Stone et al. in view of Puzzo and further in view of Wachs does not disclose, teach or suggest that "the third frequency converter heterodynes signals from the first and second frequency converters to provide a signal that is characterized by a frequency difference modulated onto the reference signal, the frequency difference being a difference between a frequency of the first signal and a frequency of the second signal" (emphasis added) as specified in claim 2.

In the first place, Stone et al. in view of Puzzo and further in view of Wachs does not disclose, teach or suggest heterodyning (i.e., multiplying as in a frequency converter). Stone et al. teaches that linear mixer 71 adds or sums signals, not heterodynes as discussed above. Puzzo teaches that microwave phase correlator 47 measures a phase difference (column 3, lines18-19)

and produces voltages proportional to the sine of the relative phase between two input signals (column 3, lines 24-42). In fact, Puzzo teaches that correlator 68 produces a signal representative of the sum of the phases of two signals (column 5, lines 22-24). Wachs teaches that linear summer 48 merely combines two signals (column 3, lines 43-44) and provides the linear sum of two signals (column 3, lines 57-59), not heterodynes.

In the second place, Stone et al. in view of Puzzo and further in view of Wachs does not disclose, teach or suggest producing "a reference signal received from the processor" as specified in claim 1, where the third frequency converter provides "a signal that is characterized by a frequency difference modulated onto the reference signal" at least because processor 84 of Puzzo does not disclosure providing a reference signal.

4. The Office Action rejects claim 8 under 35 U.S.C. §103(a) as being unpatentable over Stone et al. in view of Puzzo and further in view of U.S. Patent No.6,140,960 to Kitayoshi. This rejection is respectfully traversed.

Claim 8 depends on claim 6. For at least the reasons discussed above with respect to the rejection of claim 6, Stone et al. in view of Puzzo do not render claim 8 unpatentable. Furthermore, Kitayoshi does not disclose limitations and motivation sufficient to render claim 8 obvious. Accordingly, Stone et al. in view of Puzzo and further in view of Kitayoshi does not disclose all of the limitations discussed above with respect to the rejection of claim 6.

Furthermore, Stone et al. in view of Puzzo and further in view of Kitayoshi does not disclose, teach or suggest a receiver comprising a processor and an RF bridge coupled to the processor to receive a reference signal from the processor where the RF bridge includes:

> first and second frequency converters coupled to respective first and second antennas;
>
> a third frequency converter coupled to the reference signal and coupled between a frequency source and the second frequency converter
>
> a filter coupled between the third frequency converter and the second frequency converter

as specified in claim 8. Stone et al. in view of Puzzo and further in view of Kitayoshi do not disclose any motivation to combine or modify the applied references to achieve the above stated configuration.

Stone et al. in view of Puzzo and further in view of Kitayoshi does not disclose, teach or suggest that the filter in the above circuit configuration is a filter:

> providing a stop band at a highest frequency of a signal from the frequency source and a pass band at a shifted frequency that is a sum of a frequency of the reference signal and a lowest frequency from the frequency source

as specified in claim 8 at least because Stone et al. in view of Puzzo and further in view of Kitayoshi does not disclose, teach or suggest the above circuit configuration.

5. The Office Action rejects claims 9-11, 14-15 and 17 under 35 U.S.C. §103(a) as being unpatentable over Cash in view of U.S. Patent No. 4,717,916 to Adams et al. This rejection is respectfully traversed. The Office Action fails to establish a *prima facie* case for its rejection of claims 9-11, 14-15 and 17 under 35 U.S.C. §103(a) as being obvious over Cash in view Adams et al.

A. Initially, the Office Action merely asserts "[i]n the above, it does not clearly teach the digital frequency source." There is no clear antecedent as to what "in the above" refers. It is not clear whether it refers to:

> i. Office Action paragraph 3 rejecting claim 8 as being unpatentable over Stone et al. in view of Puzzo and further in view of Kitayoshi (different prior art references than those applied to the rejection of claims 9-11, 14-15 and 17);
>
> ii. Office Action paragraph 2 rejecting claim 2 under 35 U.S.C. §103(a) as being unpatentable over Stone et al. in view of Puzzo and further in view of Wachs (also different prior art references than those applied to the rejection of claims 9-11, 14-15 and 17); or
>
> iii. the second Office Action paragraph 1 (the paragraph relating to 103 rejections) rejecting claims 1, 6 and 21 under 35 U.S.C. §103(a) as being unpatentable over Stone et al. in view of

> Puzzo (also different prior art references than those applied to the rejection of claims 9-11, 14-15 and 17).

The Patent Office is requested to clarify the record in its next responsive communication. Regardless of which of the above three Office Action paragraphs the phrase "in the above" is intended to refer, the above three Office Action paragraphs are irrelevant to the grounds for rejection asserted for rejecting claims 9-11, 14-15 and 17 in the present Office Action at least because they relate to rejection of claims based on different prior art references. The present Office Action rejects claims 9-11, 14-15 and 17 only as being obvious over Cash in view Adams et al., and the Office Action simply fails to establish a *prima facie* case for its rejection of claims 9-11, 14-15 and 17.

B. Even for assertions actually made in the Office Action, the Office Action still fails to establish a *prima facie* case for its rejection of claims 9-11, 14-15 and 17 under 35 U.S.C. §103(a) as being obvious over Cash in view Adams et al. The determination of obviousness under 35 U.S.C. §103(a) is a legal conclusion that must be based on factual evidence. *Burlington Indus., Inc. v. Quigg*, 822 F.2d 1581, 1584, 3 USPQ2d 1436, 1439 (Fed. Cir. 1987).

The United States Supreme Court established the basic rules for analyzing an invention's obviousness and articulated three factual inquiries to be made in an obviousness determination. *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). This analysis requires a factual inquiry into (1) the scope and content of the prior art, (2) the differences between the prior art and the claimed subject matter, and (3) the level of skill of a person of ordinary skill in the art at the time the invention was made. The M.P.E.P. instructs that "examiners should apply the test for patentability under 35 U.S.C. §103 set forth in *Graham*." See M.P.E.P. 2141 through 2143. The results of the factual inquires articulated in *Graham v. John Deere Co.* provide the factual finding upon which the legal conclusion of obviousness is to be based.

C. Cash in view of Adams et al. does not disclose, teach or suggest all of the limitations specified in claims 9-11, 14-15 and 17.

Claims 9-11 and 14-15: For example and with respect to claims 9-11 and 14-15, one of the limitations that is not disclosed, taught or suggested by Cash in view of Adams et al. is a receiver comprising a processor coupled to receive an information signal from an RF bridge in which the processor includes:

> a digital frequency source to generate a reference signal based on a signal from a clock source, the reference signal being coupled to the RF bridge

as specified in claim 9, and therefore contained in all claims dependent on claim 9.

The Office Action asserts that Adams et al. "teaches the digital source to generate a reference signal based on the signal from a clock source and the reference signal being coupled to the RF bridge." This assertion is respectfully traversed.

First, the correction factor signal G(t) (i.e., see FIG. 26) exists only on the digital formatted side of the analog-to-digital converters 356, 358 and 360, and signal G(t) is not coupled to an RF bridge as specified by claim 9, and therefore contained in all claims dependent on claim 9. The window function multipliers 362, 364 and 366 cannot be regarded as part of an RF bridge at least because they are digital multipliers, not processing RF signals. As illustrated in FIG. 26, window function multipliers 362, 364 and 366 are interposed between the analog-to-digital converters 356, 358 and 360 and the temporal to Doppler transformation device 372. Processor 370 generates a correction factor signal G(t) and provides signal G(t) to the window function multipliers 362, 364 and 366 on the digital side of the analog-to-digital converters. Thus, the window function multipliers 362, 364 and 366 cannot be regarded as part of an RF bridge.

Second and contrary to assertions in the Office Action, the correction factor signal G(t) is not a reference signal based on a signal from a clock source. Instead, the correction factor signal G(t) is derived from measured quantities independent of the clock source according to columns 32, 33 and 34 and is calculated from equation 80 in column 34 of Adams et al. None of the equations in columns 32, 33 and 34 derive any signal from a clock source. Signal G(t) is described as a correction factor signal "to correct the complex voltage temporal functions for spectral smearing" (see column 35, line 31 through column 36, line 43). The spectral smearing issues are described from column 31, line 65 through column 35, line 30.

FIG. 27 of Adams et al. illustrates a specific example of the calculation of the correction factor signal G(t) by processor 370. Beginning at column 36, line 50 and continuing to column 37, line 63, Adams et al. describes how the "corrected complex Doppler frequency functions" at each frequency are applied to phase generator 376 to generate phase functions, how these phase functions are applied to subtractor 378 to generate delta phase functions, how the delta phase functions are applied to adder and subtractor 396 to produce angles θ1 and θ2, how angles θ1 and θ2 are applied to Cartesian coordinate generator 400 to produce Cartesian coordinates that include the total velocity VT, and how the total velocity VT is applied to error factor generator 402 to produce the correction factor signal G(t). Again, none of the processes used to produce the correction factor signal G(t) derive any signal from a clock source. Cash in view of Adams et al. simply does not disclose, teach or suggest "a reference signal based on a signal from a clock source" as specified in claim 9, and therefore contained in all claims dependent on claim 9.

The Office Action simply fails to set fourth a *prima facie* case for obviousness of claims 9-11 and 14-15.

In addition and with respect to claims 9-11 and 14-15, another of the limitations that is not disclosed, taught or suggested by Cash in view of Adams et al. is a receiver comprising a processor that coupled to receive an information signal from an RF bridge in which the processor includes:

> circuitry to detect a frequency difference from the information signal based on the signal from the clock source

as specified in claim 9, and therefore contained in all claims dependent thereon. In the remarks above with respect to the rejection of claim 9, the reference signal was generated <u>based on a signal from a clock source</u>. Now here, the frequency difference is detected from the information signal <u>based on the signal from the clock source</u>.

Cash in view of Adams et al. do not disclose, teach or suggest that the reference signal and the detection of a frequency difference from an information signal is <u>based on the signal from the clock source</u> as specified in claim 9.

In particular, with respect to claim 10: For example and with respect to claim 10, a limitation in addition to the limitations of claim 9 is that there is no disclosure, teaching or suggestion by Cash in view of Adams et al. of a receiver comprising a processor coupled to receive an information signal from an RF bridge in which the processor includes:

> circuitry to detect a frequency difference from the information signal based on the signal from the clock source

as specified in claim 9, and in which the circuitry to detect includes:

> a first Fourier transformer having a first center frequency; and
>
> a second Fourier transformer having a second center frequency, the first center frequency being different than the second center frequency

as specified in claim 10.

The Office Action erroneously asserts that Adams et al. discloses first and second "Fourier transformation using the window function multiplier WFM for signals (xB1-yB2) from receiver B 340 and the antenna B 334." This assertion is respectfully traversed. The window function multipliers cannot be used as Fourier transforms at least because the correction factor G(t) is not generated to have the specific weights needed to produce the Fourier transformation.

In addition, even if, *arguendo*, the window function multipliers were to be regarded as Fourier transforms, it is not sufficient that a reference teach forming a Fourier transform. The reference(s) must also teach that the information signal defined in claim 9 is the input to the Fourier transform. The applied art has no such teaching.

Claim 17: For example and with respect to claim 17, one of the limitations that is not disclosed, taught or suggested by Cash in view of Adams et al. is a method that includes capturing a frequency difference present at two antennas and further includes:

> producing an information signal onto which the frequency difference has been modulated

and

> analyzing the information signal to determine the frequency difference

where the frequency difference is the difference between the frequency of signals present at the first and second antennas as specified in claim 16 and therefore contained in claim 17 dependent on claim 16.

With respect to claim 16, the Office Action asserts that column 7, lines 3-24 of "Cash teaches the capturing of the frequency difference using phase detectors 24/26 and processor 34 to analyze the frequency difference according to equations." Contrary to this erroneous assertion, all that Cash teaches is that phase detectors 24, 26 provide an elevation or azimuth angle in electrical degrees (see column 5, line 7-10) and that processor 34 can convert the electrical degrees into any desired unit. Cash does not disclose "analyzing the information signal to determine the frequency difference" as specified in claim 16. Furthermore, Adams et al. does not disclose this feature.

In addition and with respect to claim 17, another limitation that is not disclosed, taught or suggested by Cash in view of Adams et al. is forming a Fourier transform from the information signal as the information signal is defined in claim 16.

The Office Action erroneously asserts (with respect to the rejection of claim 10 and incorporates this assertion with respect to claim 17) first and second "Fourier transformation using the window function multiplier WFM for signals (xB1-yB2) from receiver B 340 and the antenna B 334." This assertion is respectfully traversed. The window function multipliers cannot be used as Fourier transforms at least because the correction factor G(t) is not generated to have the specific weights needed to produce the Fourier transformation as discussed above with respect to the rejection of claim 10.

In addition, even if, *arguendo*, the window function multipliers were to be regarded as Fourier transforms, it is not sufficient that a reference teach forming a Fourier transform. The reference(s) must also teach that the information signal defined in claim 16 is the input to the Fourier transform. The Office Action simply fails to set fourth a *prima facie* case for obviousness of claim 17.

6. The Office Action rejects claims 12-13 and 20 under 35 U.S.C. §103(a) as being unpatentable over Cash in view Adams et al. as applied to claim 10 above and further in view of

U.S. Patent No. 4,903,030 to Maitre. This rejection is respectfully traversed. The Office Action fails to establish a *prima facie* case for its rejection of claims 12-13 and 20 under 35 U.S.C. §103(a) as being obvious over Cash in view Adams et al. and further in view of Maitre.

12 and 13: For example and with respect to claims 12 and 13, among the limitations that are not disclosed, taught or suggested by Cash in view of Adams et al. are all of the limitations discussed above with respect to claims 9 and 10, upon which claims 12 and 13 depend. Furthermore, Maitre does not disclose, teach or suggest these limitations discussed above with respect to claims 9 and 10, and therefore, Cash in view Adams et al. and further in view of Maitre does not disclose, teach or suggest all of the limitations of claims 12 and 13.

Claim 12: The Office Action asserts that "Maitre teaches the frequency discriminator 27 (figure in cover page) is coupled to the frequency analysis 26 (figure in cover page)." However, it is not sufficient that the references teach generally forming a Fourier transform and a frequency discriminator. The Office Action goes on to assert that "it would have been obvious to one of ordinary skill in the art a the time of the invention to modify Cash above, and to include Maitre' discriminator coupled to frequency analysis, such that the angle of signal arrival could be accurately measured." Even if this were true, *arguendo*, the references applied do not disclose any teaching or suggestion that would motivate a person of ordinary skill in the art to include a frequency discriminator that is coupled to the Fourier transformers specified by claim 10.

In general and with respect to claim 12, Cash in view Adams et al. and further in view of Maitre does not disclose, teach or suggest, for example, that "the circuitry to detect further includes a frequency discriminator coupled to the first and second Fourier transformers" as specified in claim 12. The Office Action contends that the first and second "Fourier transformation us[es] the window function multiplier WFM for signals (xB1-yB2) from receiver B 340 and the antenna B 334." Although this assertion is respectfully traversed at least for the reasons discussed above, even if, *arguendo*, the window function multipliers were to be regarded as Fourier transforms, it is not sufficient that the references teach generally forming a Fourier transform and a frequency discriminator. The reference(s) must also teach that it is the "circuitry to detect" (specified in the claims) that includes a frequency discriminator and that the frequency

discriminator is coupled to the first and second Fourier transformers previously specified in claim 10. The Office Action simply fails to set forth a *prima facie* case for obviousness of claim 12.

Claim 13: With respect to claim 13, Cash in view Adams et al. and further in view of Maitre does not disclose, teach or suggest, for example, that "the circuitry to detect further includes a frequency converter coupled between the information signal and inputs to the first and second Fourier transformers" as specified in claim 13. The Office Action is silent as to this limitation.

In addition, Cash in view Adams et al. and further in view of Maitre does not disclose, teach or suggest, for example, that a digital frequency source (as specified in claim 9) "further generates a digital signal coupled to the frequency converter, the digital signal being generated at a frequency to cause the frequency converter to shift a frequency of the information signal to a frequency between the first and second center frequencies."

The Office Action asserts that Cash teaches "the digital frequency generator further generates a third digital signal, to cause a frequency shift." This assertion is respectfully traversed. There is no such disclosure. Furthermore, Cash does not disclose that the digital signal is "generated at a frequency to cause the frequency converter to shift a frequency of the information signal to a frequency between the first and second center frequencies." The Office Action is silent as to this limitation.

Claim 20: Among the limitations that are not disclosed, taught or suggested by Cash in view of Adams et al. are all of the limitations discussed above with respect to claim 17, upon which claim 20 depends. Furthermore, Maitre does not disclose, teach or suggest these limitations discussed above with respect to claim 17, and therefore, Cash in view Adams et al. and further in view of Maitre does not disclose, teach or suggest all of the limitations of claim 20.

By traversing all of the above rejections based on the specific remarks discussed above, I do not intend to imply that other grounds do not exist for traversing any or all rejections.

The Office Action objects to claim 7 as being dependent upon a rejected base claim, but indicates that the claim would be allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims. Claim 7 is dependent on independent claim 6. It is respectfully submitted that claim 6 is in condition for allowance, and therefore, claim 7 is in condition for allowance.

CONCLUSION

In view of the present amendments and remarks, withdrawal of the rejections of the claims is earnestly solicited. It is respectfully submitted that the present application is in condition for allowance. Prompt reconsideration and allowance of the application are earnestly solicited. Should the examiner believe that any further action is necessary to place the application in condition for allowance, the examiner is invited to contact the undersigned applicant at the telephone number listed below. Furthermore, please note the change of address and telephone number.

Respectfully submitted,

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